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Abstract: Obesity is associated with poor breast cancer (BC) prognosis. Larger tumor size and more advanced disease stage at diagnosis could partly explain this outcome and nonadherence of obese women to BC screening may play a role. We examined the relationship between BMI (kg/m) and the use of mammography in Switzerland as well as separately in the German-speaking part with mainly opportunistic screening and in the French-speaking part with organized programs. We analyzed the data of 50-69-year-old women (n=3121) of the Swiss Health Survey 2012. Study participants were classified as underweight (BMI<18.5), normal weight (BMI 18.5-24.9), overweight (BMI 25-29), or obese (BMI 30). Outcome measures were dichotomized into 2 years or less since most recent mammography versus more than 2 years or never. We carried out multivariable logistic regression analyses, adjusting for sociodemographics, lifestyle, and self-perceived health. In Switzerland, 47% of women aged 50-69 years had had BC screening within the last 2 years, 35% of women in the German-speaking and 78% of women in the French-speaking part. In the total group, mammography use was higher in overweight than in normal-weight women (adjusted odds ratio 1.21, 95% confidence interval 0.98-1.49). Stratified by region, this effect was only maintained in women of the German-speaking part (adjusted odds ratio 1.41, 95% confidence interval 1.08-1.85; P-interaction<0.001). There were no differences in mammography attendance between normal-weight and obese and underweight women. In the 2012 Swiss Health Survey, overweight, obesity, and underweight were no barriers to mammography. In the German-speaking part, overweight women even attended mammography screening more often than normal-weight women.

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Obesity is associated with poor breast cancer (BC) prognosis. Larger tumor size and more advanced disease stage at diagnosis could partly explain this outcome and nonadherence of obese women to BC screening may play a role. We examined the relationship between BMI (kg/m^2) and the use of mammography in Switzerland as well as separately in the German-speaking part with mainly opportunistic screening and in the French-speaking part with organized programs. We analyzed the data of 50–69-year-old women ($n = 3121$) of the Swiss Health Survey 2012. Study participants were classified as underweight (BMI < 18.5), normal weight (BMI 18.5–24.9), overweight (BMI 25–29), or obese (BMI ≥ 30). Outcome measures were dichotomized into 2 years or less since most recent mammography versus more than 2 years or never. We carried out multivariable logistic regression analyses, adjusting for sociodemographics, lifestyle, and self-perceived health. In Switzerland, 47% of women aged 50–69 years had had BC screening within the last 2 years, 35% of women in the German-speaking and 78% of women in the French-speaking part. In the total group, mammography use was higher in overweight than in normal-weight women (adjusted odds ratio 1.21, 95% confidence interval 0.98–1.49). Stratified by region, this effect was only maintained in women of the German-speaking part (adjusted odds ratio 1.41, 95% confidence interval 1.08–1.85; *P*-interaction < 0.001). There were no differences in mammography attendance between normal-weight and obese and underweight women. In the 2012 Swiss Health Survey, overweight, obesity, and underweight were no barriers to mammography. In the German-speaking part, overweight women even attended mammography screening more often than normal-weight women. ***European Journal of Cancer Prevention*** **00:000–000**

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Introduction

Breast cancer (BC) is the most common cancer in women in Switzerland. In most epidemiological studies, overweight and obesity were associated with a modest increase in the risk of postmenopausal BC (Maruthur *et al.*, 2009). The increased risk of postmenopausal BC is considered to be because of increased levels of estrogen in overweight and obese women. After menopause, when the ovaries stop producing hormones, fat tissue becomes the most important source of estrogen. Because overweight and obese women have more fat tissue, their estrogen levels are higher, potentially leading to more rapid growth of estrogen-responsive breast tumors (Pischon *et al.*, 2008). In addition, adult weight gain has been associated with an increased risk of postmenopausal BC, and adjustment for body weight at younger age did not modify this association (Lahmann *et al.*, 2005). Central obesity has also been found to be associated positively with the risk of postmenopausal BC, but the association between a smaller waist circumference or waist-hip-ratio and a lower risk of postmenopausal BC seems to result from the associated correlation with BMI, that is, adjustment for overall obesity attenuated this relationship considerably (Harvie *et al.*, 2003).

In addition, being overweight or obese has been shown to influence BC mortality and disease-free survival adversely (Cohen *et al.*, 2008; Parekh *et al.*, 2012). Early detection of a tumor with better prognosis may be impaired in large breasts of obese women. It has been suggested that larger tumor size, more advanced disease stage, and grade of the tumor at diagnosis partly explain the observed poor outcome (Carmichael and Bates, 2004; Majed *et al.*, 2008; Deglise *et al.*, 2010). The findings of several, but not all, studies are in accordance with this hypothesis (Moorman *et al.*, 2001; Loi *et al.*, 2005; Chagpar *et al.*, 2007). Nonadherence to BC screening could be a possible explanation for these findings. Are obese women less likely to follow recommendations for BC screening? Meta-analyses of US-based studies observed that morbidly obese (BMI ≥ 40 kg/m^2) white women older than 40 years of age were significantly less likely to report having had a mammography within the past 2 years (Maruthur *et al.*, 2009). Personal embarrassment may be an explanation for the lower attendance at BC screening

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(Cohen *et al.*, 2008). Studies including black women (Maruthur *et al.*, 2009) and various European surveys (Peytremann-Bridevaux and Santos-Eggimann, 2007; Tekkel *et al.*, 2011; Beeken *et al.*, 2014) did not show a decreased BC screening adherence of overweight and obese women; in some studies, even an increased BC screening attendance was observed in overweight and obese women (Berz *et al.*, 2009; Tekkel *et al.*, 2011; Beckmann *et al.*, 2013). The suspected association between obesity and nonattendance at screening may be confounded by socioeconomic, lifestyle, insurance status, and other factors (Bulliard *et al.*, 2004; Peytremann-Bridevaux and Santos-Eggimann, 2007; Walsh *et al.*, 2011; Vander Weg *et al.*, 2012; Beckmann *et al.*, 2013). Remarkably, socioeconomic status was associated with participation in opportunistic (individual) mammography screening, but not with the participation in population-based programs (Palència *et al.*, 2010; Walsh *et al.*, 2011). Thus, it is worthwhile to analyze adherence to mammography separately for opportunistic and organized population-based BC screening programs.

In addition, based on a Swiss prospective BC database of the canton of Basle city, we had observed a positive association between BMI and tumor size, disease stage, and grading (Eichholzer *et al.*, 2013). However, we were not able to comment on the question of whether obesity might be a barrier to BC screening because we had no information on the general use of mammography screening. Therefore, the aim of the present study was to evaluate the use of BC screening among overweight, obese, and underweight women compared with those with normal body weight in Switzerland overall as well as in the German-speaking part, with mainly opportunistic screening, and in the French-speaking part, with organized programs. The analyses were based on results of the Swiss Health Survey (SHS) 2012, and were restricted to 50–69-year-old women, the main target group for BC screening in Switzerland (Bulliard *et al.*, 2011).

Methods

Study population and design

The current analysis used data of the cross-sectional 2012 SHS conducted by the Federal Office of Statistics (legal basis: Ordinance of the Conduct of Federal Statistical Surveys of 30 June 1993). This survey has been carried out every 5 years since 1992. It provides important information on the health status of the population, health behavior, and the utilization of health services. Because of its regular implementation, developments can be observed over time. The data also serve as a basis to plan and evaluate health policy strategies and preventive measures in Switzerland (*http://www.sgb12.bfs.admin.ch/*). This survey comprised participants selected randomly to represent the Swiss permanent population, that is, Swiss men and women and foreigners with a legal work permit aged 15 years and older, living in a private household based on registries of inhabitants. Of a sample of 41 008 individuals, a total of 21 597 agreed to participate in the survey (participation rate 54%). Individuals aged 15–74 years were interviewed by telephone. Furthermore, all participants were invited to complete a written questionnaire. Only German-speaking, French-speaking, or Italian-speaking individuals were included in the survey.

A total of 11 314 women participated in the SHS 2012. Of these, 3614 women were 50–69 years old. After excluding women with missing information on BC screening ($n = 469$) and women with no information on BMI ($n = 24$), our final dataset consisted of 3121 participants.

Measurements

The outcome measure was the dichotomized mammography status (≤ 2 years since most recent mammography vs. > 2 years or never) on the basis of telephone interview data.

The main independent variable of interest was BMI. From self-reported body weight and height, BMI (kg/m^2) was calculated and divided into the following categories (NIH, 1998): underweight (BMI < 18.5 kg/m^2), normal weight (BMI 18.5–24.9 kg/m^2), overweight (BMI 25–29.9 kg/m^2), and obesity (BMI ≥ 30 kg/m^2). Potential confounding variables included sociodemographics (age, marital status, education, area of residence, nationality), health behaviors (smoking status, alcohol consumption, physical activity), and self-perceived health. In the SHS, the entire study sample comprised the German-speaking, French-speaking, and Italian-speaking parts of Switzerland, the language regions being defined by the language of the municipality of the study participants' residence.

Statistical analyses

For valid conclusions on the Swiss population on the basis of the sample chosen, a comparison was made by the Swiss Federal Office of Statistics with the permanent 2012 Swiss population with respect to sex, age, geographic region, and nationality (Swiss/non-Swiss); any differences caused by stratification or nonparticipation were corrected mathematically. The corresponding sampling weights of the telephone interviews provided by the Federal Office of Statistics were applied for the present analyses and were used to calculate descriptive characteristics (%) and to carry out logistic regression analyses. All calculations and analyses were carried out using STATA/SE, version 13 (StataCorp, College Station, Texas, USA).

In our analyses, we used two logistic regression models. Model 1 was unadjusted and model 2 was adjusted for age (continuous), socioeconomic variables including marital status (married, registered partnership vs. single, widowed, divorced, separated, dissolved partnership), educational level (low : compulsory education or less, middle: secondary education, high : tertiary education),

area of residence (urban, rural), nationality (Swiss, non-Swiss), smoking status (current smoker, former smoker or persons who have never smoked), chronic alcohol consumption associated with a health risk (≥ 20 g ethanol daily vs. less), physical activity (≥150 min/week vs. less) (Bundesamt für Sport BASPO BfGB, Gesundheitsförderung, Schweiz bBfU, Suva, Netzwerk, Schweiz GuB, 2013), and self-perceived health status (fair, poor, very poor vs. very good, good).

In addition, we evaluated potential differences of attendance at opportunistic BC screening or population-based programs depending on BMI categories. In 2010, the entire French-speaking part of Switzerland (with the exception of one canton) was covered by an organized BC screening program. The German-speaking part of Switzerland, in contrast, started introducing organized screening programs in 2010 and later in some, but not all, cantons. Thus, at the time when the 2012 SHS was carried out, in the German-speaking part of Switzerland, mainly opportunistic BC screening existed (*http://www.brust-screening.ch*). In Switzerland, all residents are obliged by law (*http://www.bag.admin.ch/themen/krankenversicherung/04114/04123/index.html?lang=en*) to have health insurance, but BC screening as a preventive measure is only reimbursed for women aged 50 years and older every second year if the mammography is part of a screening program with predefined quality standards. Thus, in the German region of Switzerland, women have to pay for preventive BC screening, whereas in the French region, women have to pay only a small amount of money (*https://assets.krebsliga.ch/downloads/1408.pdf*). Tests for interaction were performed using the cross-product terms of the BMI categories and the dichotomized region of Switzerland (German vs. French). If the confidence intervals (CIs) of the odds ratios (ORs) did not include the value of 1.00, it was assumed that the findings were statistically significant.

Results

Table 1 summarizes the sociodemographic characteristics and lifestyle factors of the 3121 eligible women participating in the 2012 SHS, and of women of the French and German regions separately; 69.3% were living in the German-speaking part of Switzerland, 25.6% in the French-speaking region, and 5.1% in the Italian-speaking region. In terms of educational status, 16.3% of the women had a low level of education, 63.0% a middle level of education, and 20.7% had a high level of education. In the German-speaking part, a higher percentage of women with a middle level of education were observed, 73.2% were living in a city and 26.8% were living in a rural area, 87.6% were Swiss and 12.7% were of other nationalities (German-speaking and French-speaking part: 10.5 and 16.4%). The majority of women were married/living in a partnership (64.2%), the percentage being lower in the French-speaking than in the German-speaking part (59.3 and 66.0%). With respect to BMI, 3.8% were underweight (BMI < 18.5 kg/m^2), 55.9% were of normal weight (BMI 18.5–24.9 kg/m^2), 27.4% were overweight (BMI 25–29.9 kg/m^2), and 12.8% were obese (BMI ≥ 30 kg/m^2). Nearly half of the women had never smoked (49.3%), 26.4% were former smokers, and 24.3% were current smokers. Chronic daily alcohol consumption was observed in 4.9% of women. Recommendations for physical activity were not reached by 29.4% of the women, and by 24 and 40.3% of the German-speaking and French-speaking women. Self-perceived health was fair, poor, or very poor for 22.8% of the participants; for 77.2% of the women, it was good or very good (71.3% in the French region and 80.0% in the German region).

Table 1 Baseline characteristics[a] of 50–69-year-old women of the 2012 Swiss Health Survey

	Total Switzerland (%)	German region (%)	French region (%)
Women (n[b])	3121	2006	869
Women	100.0	69.3	25.6
Mammography			
Never	22.1	28.3	7.3
Within the last 2 years	46.9	34.8	78.3
More than 2 years ago	30.9	36.9	14.5
Educational level			
Low	16.3	14.9	19.3
Middle	63.0	66.0	56.1
High	20.7	19.1	24.6
Area of residence			
Urban	73.2	71.6	74.5
Rural	26.8	28.4	25.5
Nationality			
Swiss	87.6	89.5	83.6
Non-Swiss	12.4	10.5	16.4
Marital status			
Single, divorced/dissolved partnership, separated, widowed	35.8	34.0	40.7
Married/registered partnership	64.2	66.0	59.3
BMI[c]			
Underweight	3.8	3.6	3.8
Normal weight	55.9	55.2	57.8
Overweight	27.4	27.5	27.9
Obesity	12.8	13.8	10.5
Smoking status			
Never smokers	49.3	51.0	45.0
Exsmokers	26.4	25.4	29.9
Current smokers	24.3	23.6	25.1
Alcohol ≥ 20 g/day			
Yes	4.9	3.9	6.7
No	95.1	96.1	93.3
Physical activity			
< 150 min/week	29.4	24.1	40.3
≥ 150 min/week	70.6	75.9	59.7
Self-perceived health			
Fair, poor, very poor	22.8	20.0	28.7
Good, very good	77.2	80.0	71.3

[a]All proportions are weighted, except *n*.
[b]*n* missing: education = 17, marital status = 2, alcohol = 6, physical activity = 11, self-perceived health = 8.
[c]Underweight BMI < 18.5 kg/m^2; normal weight BMI 18.5–24.9 kg/m^2; overweight BMI 25–29.9 kg/m^2; obesity BMI ≥ 30 kg/m^2.

In our study group, 22.1% of the women had never had a BC screening examination, 46.9% had had one within the past 2 years, and 30.9% had had mammography more than 2 years ago (Table 1). In the German-speaking part of Switzerland, with mainly opportunistic BC screening, only 34.8% of women aged 50–69 years had had

mammography within the past 2 years, but 78.3% in the French-speaking part, with free BC screening programs, had had mammography.

Table 2 shows the associations between overweight, obesity, and underweight and BC screening within the past 2 years compared with mammography more than 2 years ago or never in the 2012 SHS. The adherence to BC screening in the overall group of women was higher in overweight women than in women with normal body weight in the unadjusted model (OR 1.28, 95% CI 1.04–1.57). After adjustment for potential confounders (i.e. age, educational level, area of residence, nationality, marital status, smoking status, physical activity, alcohol consumption, and self-perceived health), the positive association did not remain statistically significant (OR 1.21, 95% CI 0.98–1.49). With respect to obese women, we found a slightly higher adherence to BC screening compared with normal-weight women, but crude (OR 1.18, 95% CI 0.90–1.55) and adjusted results (OR 1.01, 95% CI 0.75–1.35) were not statistically significant.

Table 2 presents, in addition, BC screening rates according to BMI in the German-speaking and French-speaking parts of Switzerland. Data were too limited to evaluate mammography rates in the Italian-speaking part of Switzerland. Overweight women from the German-speaking part of Switzerland had a significantly higher attendance at BC screening than normal-weight women (adjusted OR 1.41, 95% CI 1.08–1.85); for obese women, the results were not statistically significant (adjusted OR 1.32, 95% CI 0.92–1.88). In the French-speaking region, attendance at BC screening did not differ significantly between overweight, obese, and normal-weight women (*P*-interaction < 0.001). Comparison of adherence to BC screening in women with a BMI of 25 and higher (i.e. the total of overweight and obese women) with normal-weight women resulted in similar findings, that is, a higher adherence was only observed in the German-speaking, but not in the French-speaking, part of Switzerland. Furthermore, underweight women did not differ from normal-weight women with respect to attendance at BC screening in both regions.

Discussion

Our findings of the 2012 SHS suggest that overweight and obesity do not represent obstacles to BC screening in 50–69-year-old women living in Switzerland. We observed an even higher attendance rate at BC screening in overweight women. This finding was limited to women living in the German-speaking part of Switzerland with mainly opportunistic screening strategies. In the French-speaking part with organized systematic BC screening programs, no association was observed between BMI and attendance to screening. The slightly higher adherence of obese women to mammography was not statistically significant, and neither were the results in underweight women.

Our results do not confirm the findings of some previous studies, for example from the USA, Korea, and Spain,

Table 2 BMI groups and their associations with screening[a] of women aged 50–69 years of the 2012 Swiss Health Survey: entire group of women and the French-speaking and German-speaking regions separately

	Total Switzerland				German region				French region				
	Unadjusted		Multivariable model[b]		Unadjusted		Multivariable model[b]		Unadjusted		Multivariable model[b]		
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	*P*-interaction[c]
BMI													
Underweight (BMI < 18.5 kg/m^2)	1.03	(0.65–1.62)	1.05	(0.66–1.69)	1.16	(0.59–2.28)	1.22	(0.62–2.37)	0.69	(0.29–1.66)	0.67	(0.27–1.67)	
Normal body weight (BMI 18.5–24.9 kg/m^2) (Reference)	1		1		1		1		1		1		
Overweight (BMI 25–29.9 kg/m^2)	**1.28**	**(1.04–1.57)**	1.21	(0.98–1.49)	**1.44**	**(1.11–1.88)**	**1.41**	**(1.08–1.85)**	1.26	(0.82–1.96)	1.14	(0.73–1.77)	
Obesity (BMI ≥ 30 kg/m^2)	1.18	(0.90–1.55)	1.01	(0.75–1.35)	1.39	(0.99–1.95)	1.32	(0.92–1.88)	1.10	(0.61–1.99)	0.85	(0.46–1.58)	< 0.001

Bold values indicate statistical significance.
CI, confidence interval; OR, odds ratio.
[a]All proportions are weighted.
[b]Adjusted for age, educational level, area of residence, nationality, marital status, smoking status, alcohol consumption, physical activity, and self-perceived health.
[c]Interaction between the German and the French region and BMI categories.

showing that obese women were less likely to follow recommendations for BC screening than normal-weight women (Cohen *et al.*, 2008; Maruthur *et al.*, 2009; Park *et al.*, 2012; Martín-López *et al.*, 2013). Accordingly, in a meta-analysis published in 2009, including studies carried out in the USA (Maruthur *et al.*, 2009), a significant overall inverse relationship was found between class III obesity (BMI $\geq$40 kg/m^2) and recent mammography. In white women, a significant negative association with class II (BMI 30–34.9 kg/m^2) and class III obesity was observed. As Cohen *et al.* (2008) pointed out, few studies have investigated the reasons why overweight and obese women have a lower attendance at BC screening. For these authors, some reasons may not be weight related (e.g. discomfort, being unaware of the importance of screening, not having any health problems). Other reasons may be weight specific, such as fear of receiving unwanted weight-loss counsel from medical doctors and personal embarrassment.

Our results are also not in agreement with the results of surveys showing no associations between BC screening attendance and overweight or obesity. Accordingly, in African–American women, for example, obesity did not negatively influence BC screening adherence. Women of different ethnicities seem to perceive their weight differently (Caldwell *et al.*, 1997; Flynn and Fitzgibbon, 1998; Fitzgibbon *et al.*, 2000; Anderson *et al.*, 2002; Park *et al.*, 2012), and this may influence the willingness to undergo mammography (Wee *et al.*, 2004). In addition, in the 10 European countries participating in the Survey of Health, Ageing and Retirement in Europe (SHARE), overweight and obesity did not represent a barrier to mammography use (Peytremann-Bridevaux and Santos-Eggimann, 2007). The results of a more recent study from the UK (Beeken *et al.*, 2014) are in agreement with the SHARE findings.

The nonexistence of lower BC screening rates among overweight and obese compared with women with normal body weight living in Switzerland and other European countries in contrast to the USA may be because of a higher percentage of moderately and severely obese women in the USA than in Europe (Peytremann-Bridevaux and Santos-Eggimann, 2007). In our study group of women aged 50–69 years, no more than 1.3% (data not shown) had a BMI of 40 and higher, whereas the prevalence in the USA was 9.8% in women aged 40–59 years in NHANES 2011/12 (Ogden *et al.*, 2014). Thus, our severely obese group might have been too small to detect an association with mammography, especially as barriers to mammography seem to increase with increasing BMI.

In our study, overweight and obesity not only represented no barrier to BC screening use, in overweight women living in the German part of Switzerland, mammography adherence was even significantly higher than that in normal-weight women. Similarly, an increased BC screening attendance was observed for overweight and obese women in a study carried out in South Australia (Beckmann *et al.*, 2013), for overweight women in the 2004 US Behavioral Risk Factor Surveillance Survey (BRFSS) from the USA (Berz *et al.*, 2009), and for overweight women in an Estonian study (Tekkel *et al.*, 2011). According to Beckmann *et al.* (2013), normal-weight women with smaller breasts might be more confident in finding breast irregularities through self-examination and might therefore consider the necessity to attend mammography screening as less compelling.

In the present study, the higher BC screening adherence of overweight than normal-weight women was only observed for women living in the German-speaking part of Switzerland with mainly nonopportunistic screening strategies. According to Walsh *et al.* (2011), in opportunistic programs, the burden of arranging mammography falls on the individual. In addition, opportunistic programs may be more likely to have financial barriers associated with them (in that individuals may be more likely to pay for access) than population-based programs (Walsh *et al.*, 2011). In Switzerland, women of lower social classes are more often affected by overweight than women belonging to the highest social class (Eichholzer *et al.*, 2010). Thus, payment cannot be the argument for the higher screening attendance of overweight women in opportunistic programs. The higher attendance of mammography in overweight women from Estonia was only observed in those who received a written invitation and not for opportunistic screening (Tekkel *et al.*, 2011). Similar results were observed in the survey from Australia (Beckmann *et al.*, 2013).

The association between overweight, obesity, and attendance for BC screening may be confounded by various factors. Previous studies generally showed that marital status, social class, tobacco smoking, alcohol drinking, health insurance status, general health perception, region of residence, physical activity, and nationality were associated with adherence to mammography screening (Galán *et al.*, 2006; Peytremann-Bridevaux and Santos-Eggimann, 2007; Berz *et al.*, 2009; Simou *et al.*, 2010; Vander Weg *et al.*, 2012; Martín-López *et al.*, 2013). Even though we adjusted for all these factors (with the exception of health insurance) in our study, residual confounding could still be a potential explanation for our unexpected results, which should be further investigated.

Study strengths and limitations

The strengths of our study included the large database of a representative sample of noninstitutionalized individuals 15 years and older living in Switzerland, allowing limitation of our analyses to women aged 50–69 years. We did not merge underweight with the normal-weight women because adherence to BC screening might differ between these groups (Fontaine *et al.*, 2001; Berz *et al.*, 2009). Nevertheless, the main aim of the present study was to evaluate the association of overweight and obesity with adherence to BC screening.

This study also has several limitations. It is a cross-sectional survey; thus, causality cannot be inferred. In addition, data were self-reported. This could result in reporting and/or recall biases. Selection bias cannot be excluded because, in the SHS, participants were selected from the resident population in private households, excluding individuals living in homes for the elderly, or other similar institutions or collective households. In addition, 46% of eligible participants did not participate (32% were not attainable despite repeated attempts to reach them, 13% refused because of lack of interest and/or lack of time, etc.). The use of weighting factors nevertheless allowed for the extrapolation of the results in relation to age, sex, region, and nationality from the sample to the total population living in Switzerland (*http://www.sgb12.bfs.admin.ch/*). Extrapolation of results of other subgroups could be impaired because of the missing values for nonparticipants. It is for example known that nonparticipants of health surveys tend to belong to lower socioeconomic and less health conscious groups compared with participants. This could lead to underestimation and overestimation of the associations observed (Delgado-Rodriguez and Llorca, 2004).

In terms of mammography use, women seem to overestimate their adherence to cancer screening and to report it as occurring more recently then it actually did (Rauscher *et al.*, 2008; Howard *et al.*, 2009). For self-reported weight and height in most, but not all, studies, individuals overestimated their height and underestimated their weight. This was particularly true for obese women. BMI therefore tends to be underestimated (Connor Gorber *et al.*, 2007; Peytremann-Bridevaux and Santos-Eggimann, 2007; Faeh *et al.*, 2008). Thus, the actual percentage of overweight and obese women in the present study is most probably higher than our estimates. Another limitation is the lack of information in the 2012 SHS on why women did not follow BC screening recommendations.

Conclusion

The results of the 2012 SHS indicate that overweight and obese women do not attend mammography screening less often than normal-weight women. In the German-speaking part of Switzerland, with mainly opportunistic screening, even the opposite is true for overweight women. In the French-speaking region, with organized BC screening programs, the screening attendance did not differ significantly between overweight, obese, and normal-weight women. Thus, for Switzerland, high body weight does not seem to be a barrier to mammography use.

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Conflicts of interest

There are no conflicts of interest.

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